202 Factors influencing pregnancy loss in lactating dairy cows. James Richard. Pursley[1], Thaina MInela[1], Joao Paulo Martins[2], Emily Middleton[1], [1]*Michigan State University,* [2]*University of Wisconsin*

Pregnancy loss in high producing dairy cows is significant and negatively affects profitability of dairy farms. It is not clear the extent of pregnancy loss prior to a subsequent estrus or first pregnancy diagnosis. It is clear that percent of cows losing pregnancies are greatest following 1st pregnancy diagnoses then decrease in a time-related fashion throughout gestation. Non-disease related factors that are associated with pregnancy losses in dairy cows include parity, timing of AI relative to ovulation, circulating concentrations of progesterone during growth of the ovulatory follicle(s), double ovulations, unilateral twins, service sire, extent of change in body condition during early lactation, and serum levels of pregnancy associated glycoproteins at 24 or 28 d post-AI. Metabolic changes related to high milk production resulted in a greater chance for double ovulations. A growing body of literature indicates that cows with unilateral double ovulations and unilateral twins have a greater chance for pregnancy loss during the 1st 90 d of pregnancy compared to cows with single ovulations or bilateral twins. It also appears there is a preferential timing of loss in cows with double vs. single ovulations. Levels of circulating concentrations of progesterone during follicular wave development affect follicular development of cows. In a study that controlled progesterone during follicular development, low levels of progesterone caused a greater percentage of cows to have double ovulations and increased chances for pregnancy loss after 35 d post-AI. Lastly, it appears that cows that lose body condition during the 1st 30 DIM have a greater chance of pregnancy loss between 35 and 69 d post-AI compared with cows that maintained or gained body condition during that period. These data lead towards a greater understanding of the potential causes of pregnancy loss in dairy cows and can be instrumental in the development of reproductive technologies to reduce these losses.

Key words: dairy, pregnancy loss, double ovulation

203 How reproductive management technologies will shape the dairy industry 50 years from now. Jack H. Britt, *North Carolina State University*

Globally, dairy consumption will increase several-fold over the next five decades as the human population expands beyond 10.5 billion people. Climate change will cause dramatic shifts in where dairy farms are located, particularly where availability of water becomes rate-limiting. Average size of dairy herds and production per cow will more than double worldwide, but number of dairy cows will decline. Greatest advances in use of technology will be in largest herds, but some technologies will jump from lower levels to higher levels, such as resistance to tropical diseases as climate warms. Sensors, automation and robotics will allow continuous monitoring and management of a farm's animals and ecosystems. Time of ovulation will be detected automatically, and cows will be inseminated, or embryos transferred by robotic systems. Managing the epigenome to improve fertility and health will accelerate because cloud-based data, accessible through Blockchain systems, will provide ways of rapidly accessing temporal relationships between environmental events and biological responses. RNA-based technologies and novel complexes of microbes will replace many of today's hormonal or therapeutic procedures. Several consecutive generations of breeding will be done routinely in vitro before selected generations of embryos are released for transfer. There will be distinct lines of cattle derived from global Holstein populations with genes from other breeds, and these lines will populate approximately five latitudinal regions globally. Major advances will be made in understanding why health and productivity differ among herds within common physiographic settings. We will learn how cows within a herd communicate, and our robots will communicate with cows in their herd. Milk and dairy products will be much more specialized, with greater emphasis on fatty acids, bio-active nutrients and amino-acid sequences in order to feed the global population most efficiently.

Key words: future dairy herd